Final Report of the Subcommittee on the Health Effects of Polychlorinated Biphenyls and Polybrominated Biphenyls of the DHEW Committee to Coordinate Toxicology and Related Programs

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Introduction

by DHEW Subcommittee on Health Effects of PCBs and PBBs*

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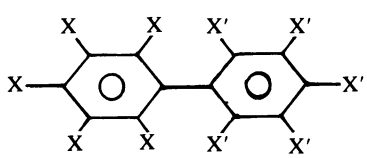
PCBs were reportedly first synthesized in 1881 by Schmidt and Schultz (*1*), but were not available commercially until 1930 (*2*). From 1930 until 1970, when their distribution in the U. S. was voluntarily restricted by Monsanto to closed systems, the use of PCBs in a wide variety of industrial applications had steadily increased.

Commercial PCBs are complex mixtures of chlorinated biphenyls plus trace amounts of various contaminants. Aroclor 1254, for example, has been reported to contain 69 different chlorinated biphenyl compounds (*3*) which differ in the number and position of chlorine atoms on the parent ring system, where X or X′ represents either a Cl atom or a H atom on the six-membered carbon rings. Two such six-membered rings, joined by a carbon to carbon bond between the rings, form the parent biphenyl ring system.



The problem of polychlorinated biphenyls (PCBs) became a national concern in 1971, when several accidental contaminations of foods were reported. In addition, the extent of the environmental contamination and its persistence were not precisely known. Subsequently, various regulatory actions were taken by the concerned agencies involved and, with the cooperation of the only U. S. producer, the situation was felt to be under control.

Then, in 1975, the reported high levels of contamination with PCBs of Hudson River fish refocused national attention on this environmental contaminant. It was soon apparent that the actions and control measures of the early 1970's had not succeeded in totally reducing, or even substantially alleviating the problems associated with this environmental pollutant.

On November 17–19, 1975, a National Conference on Polychlorinated Biphenyls (*4*), sponsored by the Environmental Protection Agency in cooperation with the Department of Agriculture, Council on Environmental Quality, Department of Health, Education and Welfare and Department of the Interior, was held in Chicago, Illinois. This conference brought together scientific expertise to consider the latest data, and all aspects of the various problems associated with PCBs and the means for their possible resolution.

In his introductory remarks to the Session on Health Effects and Human Exposure, Dr. David P. Rall, Session Chairman, announced the formation of a Subcommittee on PCBs of the DHEW Committee to Coordinate Toxicology and Related Programs. The Subcommittee was given the charge to: assemble, review and interpret data that assesses the health significance of polychlorinated biphenyls and to formulate recommendations as to future needs.

The accidental contamination of animal feeds with polybrominated biphenyls (PBBs), and con-

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sequent human exposures, that occurred in the State of Michigan, has been approached not only on its own basis, but in comparative relationship to the PCBs, as well. Therefore, the scope of this Subcommittee was expanded to the Subcommittee on the Health Effects of PCBs and PBBs. Members of this Subcommittee came from within the Department of Health, Education and Welfare, as well as including consultants from other Federal Agencies concerned with this difficult problem.

The purpose of this subcommittee was twofold: to (1) assemble, review and interpret data that assess the health significance of polychlorinated biphenyls and to (2) formulate recommendations as to future research needs.

Specific objectives of the Committee were (1) to assess the impurities that may be found in PCBs and PBBs, the "hardness" of the data giving their potential for accumulating in the food chain; (2) to assess the metabolism of PCBs and PBBs and the possible contribution of specific isomeric homologs to the observed toxicity, evaluate possible effects at the cellular level, and define existing dose-response relationships for the phenomena; (3) to assess the short- and long-term effects, including carcinogenesis, of exposure to PCBs and PBBs in various animal models, their relationship to known human effects, and the establishment of dose-response curves; (4) to quantify known human exposures, accidental pulsed, and long-range, their relationship to possible overt symptomatology, and the establishment of possible dose-response curves.

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